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Affective Dilemmas: The Impact of Trait Affect and State Emotion on Sustainable Consumption Decisions in a Social Dilemma Task

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Abstract

Developing a more sustainable lifestyle is becoming an important challenge of our times; it is thus crucial to understand the factors that drive resource consumption decisions. We investigated the impact of trait affect and state emotion on individual consumption decisions in social dilemma tasks. Affective factors interacted strongly with the specific structural features of the choice situation. In Experiment 1, participants with high trait affect were especially likely to reduce their consumption when resource scarcity increased, but only when the choice was presented in a gain frame. In Experiment 2, induced guilt led to reduced consumption in the gain frame in participants with high trait affect, whereas induced pride led to increased investments in the loss frame in these participants. Our research highlights the adaptive function of affective factors in decision making in social dilemma tasks and illustrates how emotions may be leveraged to promote more sustainable resource consumption.

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The climatic changes that have been increasingly observed in recent years are to a large extent driven by human activities linked to energy overconsumption and overreliance on fossil energy sources. As a consequence, developing a more sustainable lifestyle is becoming one of the most pressing tasks facing our society. It is of utmost interest to gain a better understanding of the mechanisms driving environmentally relevant decisions and behaviors related to resource use to develop more targeted intervention strategies based on new insights about behavioral levers. Ever since Hardin's seminal work on the tragedy of the commons, research has investigated factors that influence individual resource consumption decisions (Hardin, 1968; Ostrom, Burger, Field, Norgaard, & Policansky, 1999). One experimental paradigm that has been especially fruitful in promoting our understanding of these decisions is the social dilemma task (Van Lange, Joireman, Parks, & Van Dijk, 2013). A social dilemma refers to a situation in which multiple individuals share access to a common resource and can freely choose how much of the resource they want to claim for themselves. In doing so, they are negotiating an internal conflict between acting in their individual short-term interest (i.e., claiming a lot of the resource for themselves) or in the long-term interest of the group (i.e., constraining their individual resource consumption to avoid resource depletion). Using this paradigm, both the impact of structural aspects of the choice situation (such as resource scarcity, choice framing, or group size) and the impact of stable interindividual differences on the side of the decider (such as values, personality traits, or gender) have been investigated (for a review see, for example, Balliet, Parks, & Joireman, 2009).

Although the impact of these structural and stable interindividual aspects has been thoroughly examined, not much research has addressed the role of emotions in the social dilemma task and in environmental decision making in general (for exceptions see, for example, Graton, Ric, & Gonzalez, 2015). The relative neglect of the role of emotion and affect in environmental decision research is surprising in light of the large number of research findings that have accumulated over the last two decades outside the environmental domain, illustrating the impact of state emotions (DeSteno, Li, Dickens, & Lerner, 2014; Nelissen & Zeelenberg, 2009) as well as trait affect (see, for example, Cohen, Wolf, Panter, & Insko, 2011; Shiota, Keltner, & John, 2006) on decision making and emphasizing the powerful, pervasive, and often adaptive influences of emotions on our decisions (for reviews, see Lerner, Li, Valdesolo, & Kassam, 2015; Pham, 2007). Emotions are transient reactions that

are elicited when a specific situation is evaluated as relevant for a person's specific set of needs, goals, and values (Brosch, 2013). Thus, emotional reactions are based on the interaction of the affective predisposition of an individual (active needs, goals, values, appraisal tendencies) with the structure of the concrete choice situation (Scherer & Brosch, 2009). Once elicited, an emotion has a strong impact on one's tendencies to decide and to act. Given that the resource conflicts represented in social dilemmas are highly relevant to individual well-being and survival and are closely intertwined with one's beliefs, needs, and values, it can be expected that emotions play a considerable role in determining individual decision making in this type of task. The aim of the work presented here was to increase our understanding of how emotions influence individual decisions in the social dilemma task. A better understanding of these influences may provide important insights for the development of new intervention strategies aiming at motivating pro-environmental behaviors and sustainable decisions.

Structural Determinants of Decisions in Social Dilemmas

The Impact of Resource Scarcity

As long as resources are abundant, the conflict between individual and collective long-term interest is not very salient. However, once resources are in short supply, the need to adapt one's behavior becomes concrete and urgent. Theoretical predictions concerning the impact of resource scarcity on consumption decisions are somewhat contradictory. Rational actor theories predict that people will increase their resource consumption when resources get scarce to ensure that they can maximally benefit from the resource before it is depleted (Kramer, 1989). Other authors have pointed out that under scarcity, people may start to worry about the state of a resource and begin reducing their consumption (Arnold, 1999; Ostrom et al., 1999). Empirical evidence from the social dilemma literature mainly supports the second perspective: Participants in general consume less when resources are scarce compared with when they are abundant from the beginning of the task (Rutte, Wilke, & Messick, 1987; Samuelson, Messick, Rutte, & Wilke, 1984) and are able to dynamically reduce their consumption when resource scarcity increases during the task (Oéses-Eraso, Udina, & Viladrich-Grau, 2008).

The Impact of Choice Framing

A second structural aspect that has been shown to influence decisions in social dilemma tasks is choice framing. Experimental social dilemma tasks

are used in two basic forms: the commons dilemma, in which the participant decides how much to take from a common resource, and the public goods task, in which the participant decides how much to contribute to a common resource. These two versions of the task reflect two decision types that are highly relevant in the context of sustainable behavior, i.e., curtailment and investment decisions (Samuelson, 1990), and may thus yield important insights into the psychological mechanisms that underlie the willingness of individuals to directly reduce their resource consumption (e.g., taking shorter showers, using their car less often) and the willingness of individuals to invest into more sustainable technologies (e.g., buy a more efficient fridge, invest into photovoltaics), respectively.

The different choice sets represented in the commons dilemma ("take" vs. "do not take") and the public goods task ("give" vs. "do not give") trigger an asymmetric valuation process that has been formalized in prospect theory (Kahneman & Tversky, 1979). According to this theory, the displeasure associated with losses is up to twice as intense as the pleasure associated with gains. Driven by loss aversion, people go to greater lengths to avoid a loss than to obtain a gain and, thus, can be expected to invest to a lesser extent in the public goods task than they would be willing to reduce their consumption in the commons dilemma. Laboratory research has indicated that this is indeed the case (e.g., Andreoni, 1995; Brewer & Kramer, 1986) but has also revealed that the effect may be modulated by factors such as social identity or group size (see Kopelman, Weber, & Messick, 2002 for a review).

Individual Attributes of the Decider

The Role of Core Values in Social Dilemmas

Concurrently with structural aspects of the choice situation, internal attributes of the decider such as their core values have been shown to explain decision patterns in social dilemma tasks (e.g., Kopelman et al., 2002). Core values are stable motivational beliefs about the desirability of outcomes. They can be organized using several dimensions (Schwartz, 1992), one of which opposes self-enhancement values and self-transcendence values. Self-enhancement values refer to power and achievement-related goals and choices, whereas self-transcendence values reflect an individual's concern for other humans as well as for the well-being of the planet and the ecosystem. Self-transcendence values have been shown to be important predictors of environmental decisions in many contexts (Dietz, Fitzgerald, & Shwom, 2005). Similarly, values subordinated to the self-transcendence domain such as biospheric or altruistic values have been shown to be drivers of pro-environmental outcomes, whereas

values subordinated to the self-enhancement domain such as hedonic and egoistic values were associated with environmentally unfriendly decisions (de Groot & Steg, 2008 (Hahnel, Ortmann, Korcaj and Spada, 2014)).

Previous studies have demonstrated effects of individual value differences on decision making in a variety of economic games (Brosch & Sander, 2016; Kopelman et al., 2002, for reviews). However, these studies have mostly focused on participants' social value orientation (SVO; for an exception see Klein, Hilbig, & Heck, 2017). SVO (Van Lange, 1999) is a measure that directly reflects one's preferences for the distribution of resources, which is inferred based on a series of decisions. Here we complement this research by using core value measures derived from the Schwartz value spectrum (Schwartz, 1992; see Sheldon & McGregor, 2000, for a similar rationale).

The Role of State Emotion and Trait Affect in Social Dilemmas

Although emotions have often been considered as irrational biases that lead to decisions that are not in the best interest of the individual, contemporary emotion theories emphasize the adaptive function of emotions (see, for example, Brosch, Patel, & Sander, 2014). Emotions are conceptualized as transient phenomena that are elicited by the appraisal of the information in one's current environment concerning its relevance for one's goals, needs, and core values. Situations that are either conducive to or incongruent with important concerns may trigger emotional responses that incorporate changes in physiology, action tendency, expression, and feeling and, thus, prepare the organism to take an action appropriate to the currently presented challenge (e.g., Brosch, 2013 (Frijda 2007)).

Thus, instead of conceptualizing emotions as irrational processes that interfere with rational decision making, contemporary perspectives rather consider emotions as the situational manifestation of an individual's concern and value structure. Thus, a certain overlap between emotions and core values is to be expected, given that the congruency or incongruency of a certain situation or choice with one's core value hierarchy is one out of several potent elicitors of emotional responses. In contrast to core values, however, which are exclusively cognitive structures, emotions are multifaceted phenomena that consist of multiple components, including physiological reactions and motivational action tendencies, which are needed to mobilize the organism to deal with a relevant situation in a specific, adaptive manner (e.g., Brosch, 2013; Scherer, 2009). Thus, emotions can be expected to influence decision-making processes over and above the influence driven by individual values only.

And indeed, research in the affective sciences has illustrated that emotions and affective processes contribute to a successful functioning of the human mind as well as to adaptive decision making (Damasio, 1994; Lerner et al.,

2015). Also in the environmental domain, recent research has begun to investigate the impact of emotions on decision making (see, for example, Antonetti & Maklan, 2014; Bissing-Olson, Fielding, & Iyer, 2016; Graton et al., 2015; Harth, Leach, & Kessler, 2013; Schneider, Zaval, Weber, & Markowitz, 2017). For instance, guilt induced by environmental messages was shown to increase participants' intentions to repair environmental damages, whereas pride increased intentions to invest in environmental protection (Harth et al., 2013). Guilt, an emotion triggered by a social rule violation, constitutes a negative feeling that motivates reparation or compensatory behavior (Ketelaar & Au, 2003). If a direct reparation is not possible, guilt may lead to self-punishing behaviors such as self-denied pleasures (Nelissen & Zeelenberg, 2009). Pride, an emotion triggered by a personal achievement, makes people feel good about themselves based on their previous actions and may motivate continued positive actions to keep up the positive affect. Moreover, pride and its related displays are related to success and achievement and, thus, serve to communicate the social status of the individual (Tracy, Shariff, & Cheng, 2010).

Also in the context of the behavioral conflicts represented in social dilemmas, emotions can be expected to play an important role in shaping and guiding decisions. Due to the transient nature of emotions, however, they should not be expected to exert a stable influence across situations (in contrast to core values or SVO) but rather to be triggered by specific aspects of a given situation. Focusing on the flexible, adaptive function of emotions, we were thus particularly interested in examining whether emotions would be especially sensitive to the structural aspects of the choice situation. More concretely, we wanted to test whether *state emotions* would have different impacts (a) as a function of changes in resource scarcity and (b) as a function of choice framing in the social dilemma task.

Importantly, different people may react with different emotional responses to the same situation as a function of their central needs, goals, and values (Scherer & Brosch, 2009). For example, one person may be prone to react with guilt upon hearing that his or her actions have a negative impact on the environment, whereas another may remain unaffected. Differences in the general disposition of an individual to react emotionally in situations with environmental impact may thus be a useful predictor of environmental decision making in itself. Individual differences in trait affect have been examined for a variety of different emotions outside the environmental domain, such as trait anger or trait anxiety (Spielberger, Sydeman, Owen, & Marsh, 1999). Expanding this notion to the environmental domain, here we were moreover interested in testing (c) whether the impact of *state emotions* on decision making would depend on an individual's *trait affect* in the environmental domain and (d) whether *trait affect* would in itself interact with changes in resource

scarcity and the choice framing. Scales measuring individual differences in the environmental domain primarily incorporate cognitive concepts such as values, norms, or concerns (Schultz, 2001; Steg, Perlaviciute, van der Werff, & Lurvink, 2014; Thøgersen, 2006), whereas scales specifically measuring affective predispositions regarding environmental behavior are, to our knowledge, nonexistent (for research on general emotional affinity toward nature; see Kals, Schumacher, & Montada, 1999). Thus, we developed a set of items to measure individuals' environmental *trait affect*.

The Present Research: Research Aims and Hypotheses

Here we investigated the impact of trait affect and state emotion on individual decision making in a social dilemma task. In contrast to core values, which show a stable effect on decisions over time (Schwartz, 1992), we expected emotional factors to show more situation-specific influences by interacting with the specific structural features of the choice situation (resource scarcity and choice framing).

In the first experiment, we investigated the effect of core values as well as trait affect on decision making in two versions of the social dilemma task, a commons dilemma task and a public goods task. Based on previous research on the important role of values for environmental decision making (Dietz et al., 2005), we predicted that higher self-transcendence values would be related to lower resource consumption overall (*Hypothesis 1*). More importantly, however, we expected that trait affect would interact with the structural features of the task. Concretely, we predicted that higher trait affect would be related to a more pronounced consumption reduction once resources become scarce during the course of the task (*Hypothesis 2*). We expected this relevant change in the environment (i.e., increased scarcity) to trigger an affective reaction signaling the need to adapt one's behavior, especially in participants with high trait affect.

Previous research has furthermore shown that affect is a critical determinant of the framing effect as individual differences in loss aversion have been linked to differences in physiological affective reactions to losses (Sokol-Hessner et al., 2009). Thus, we expected individual differences in sensitivity to choice framing to be related to individual differences in trait affect (*Hypothesis 3*).

Although we assumed that in Experiment 1, participants would experience emotions during the task (especially, participants with high trait affect), we cannot be sure that they actually did. Thus, to more directly address the question of whether state emotion influences decision making during the social dilemma task, in Experiment 2, we induced one out of two *state emotions* (guilt or pride) in our participants before the social dilemma task. We

predicted that the emotion induction would interact with the framing of the task (*Hypothesis 4*). Previous findings on the function of guilt and its behavioral consequences point to a potential role of guilt, especially, in the gain frame, when people can decide to curtail their consumption of a resource (Nelissen & Zeelenberg, 2009). Thus, we expected that induced guilt would lead to reduced consumption in the gain frame. Pride, in contrast, has been previously linked with achievement, status, and success, as well as increased investment intentions (Harth et al., 2013). Thus, we expected that induced pride would lead to increased investment decisions in the loss frame.

Finally, we wanted to investigate the link between trait affect and state emotion. The emotional states induced in Experiment 2 were not triggered by the decision at hand but were incidental emotions (Lerner et al., 2015). Trait affect, however, reflects individual differences concerning the probability with which people experience integral emotions in environmentally relevant situations. It is thus possible that the effect of incidental state emotions on environmental decision making is more pronounced in people with high trait affect as they habitually experience emotions in environmentally relevant situations and may regularly use them as a behavioral guide. Thus, we tested our central hypothesis that the predicted interactions of state emotion and choice framing would be modulated by individual differences in trait affect (*Hypothesis 5*).

Experiment 1

We designed two versions of the social dilemma task: a commons dilemma task, where in each round participants can decide to take a certain number of points for themselves, and a public goods task, in which participants are automatically allocated points at the beginning of each trial and can then decide to contribute a certain number of points back to the common resource. We experimentally varied the amount of resource scarcity across the experiment by introducing several experimental phases, allowing us to compare participants' behavior in situations when resources are plentiful and when available resources become scarcer. In contrast to previous studies using social dilemma tasks, in our task, the status of the pool at the beginning of a new trial was controlled by the experimenter, that is, not actually influenced by the decisions of the participant during the task. This setup better reflects environmental social dilemmas in real life, where individual actions have almost no directly observable effects (Stern, 2011). Moreover, this allowed us to present each participant with identical levels of available resources during the whole task, thus maximizing sensitivity to individual differences. Before the experiment, we measured our participants' core values and environmental trait affect.

Method

Participants. A total of 93 students of the University of Geneva (83 females, M_{Age} = 22.6, SD_{Age} = 5.4) participated in the experiment. A power analysis concerning our main hypotheses for this experiment revealed that the likelihood of correctly detecting a significant increase in variance in the dependent variable, given a medium effect size of f^2 = .15 (Cohen, 1988) and the respective sample size of Experiment 1, was 95.8%.

Measures. About 4 months before the actual experiment, participants filled in a set of standardized questionnaires to assess core values and environmental trait affect. Core values were measured using the Schwartz Value Inventory (SVI, Schwartz, 1992). Individual scores for self-transcendence values were formed by averaging scores across the respective value types after controlling for individual response tendencies (Cronbach's α = .88). Two participants were excluded because of extreme scores (more than 3 *SD* below the mean). Environmental trait affect (see Brosch et al., 2014) was assessed by means of eight items (e.g., "How often do you feel ashamed because you wasted energy?", "How often do you feel indignant because others waste energy?"). All responses were assessed using 5-point scales (ranging from "never" to "very often") and combined into a single score (Cronbach's α = .80). The correlation for self-transcendence values and trait affect aggregated across participants for both experiments was moderate, r = .30 (Z = 4.06, p < .001, $r_{Experiment1}$ = .13, p = .21, $r_{Experiment2}$ = .45, p < .001).

Experimental Design. The experimental design was a 3 × 2 factorial design with the within-subject factor *scarcity phase* (early/intermediate/late) and the between-subjects factor *choice framing* (gain frame/loss frame). Participants were randomly assigned to either the gain frame or the loss frame condition.

Procedure. Participants performed the task in an experimental room with six cubicles containing individual computer terminals. The experimenter explained to the participants that they would perform the experiment together with an unspecified number of other participants from the University of Geneva and from other universities via a network of connected computer terminals. This information was introduced to be able to increase the perceived number of players and the size of the resource pool, adding plausibility to the fact that an individual participant's choices did not visibly influence the status of the resource pool in the next round. Participants were told that they would be sharing a common resource represented by points, with the initial resource pool containing 2,000 points. In each trial, they were to

distribute 10 points between themselves and the common pool. After each participant had made a choice, the computer would adapt the size of the resource pool as a function of the individual decisions. Before each new trial, the resource pool would be replenished, which could vary in its extent. The number of points in the resource pool in the new trial was thus ostensibly influenced by both resource consumption and new resource production. Thus, if participants kept more points for themselves than could be replenished, the resource would decline and eventually be depleted. Resource availability was experimentally controlled to be equivalent across the two framing conditions, regardless of participants' individual decisions. Participants were told that as a function of their performance during the task, they would have the opportunity to win two prizes: By accumulating as many points for themselves as possible, they would increase their chance to win a cinema ticket. By maintaining the common resource pool for as long as possible, they would not only increase their opportunity to accumulate points but would also increase their chance to have a parcel of Amazonian rainforest bought in their name (via the Cool Earth association). These rewards were introduced to reinforce the competing motivations underlying choices in social dilemmas: immediate gratification of selfish behavior (reflected in the cinema ticket) versus more distant rewards of altruistic self-restriction (reflected in a saved parcel of rainforest).

At the beginning of the experiment, the computer display showed a bogus synchronization procedure. Participants then went on to make a total of 45 individual decisions. Choice framing was manipulated between participants via the nature of the decision that participants made on each trial. In the gain frame, participants were asked on each trial how many points (from 0 to 10) they wanted to take from the common resource pool, which were then added to their personal resource pool. In the loss frame, participants were told that at the start of each trial, 10 points would automatically be deposited in their personal resource pool, and then were asked how many points (from 0 to 10) they wanted to contribute to the common resource. In both conditions, at the end of a trial, feedback was provided about the overall decisions of the group, the replenishment, and the resulting state of the resource pool. In addition, after every 5th trial a bar graph illustrating the development of the resource pool was displayed. Trials were separated into three phases of 15 trials each. In the *early phase* (Trials 1-15), feedback indicated that the resources used by the participants were mostly replenished, that is, the total pool size in each new trial varied between 2,000 and 1,800 points, without drastic decreases. At the beginning of the *intermediate phase* (Trials 16-30), participants were notified that replenishment would be less complete, and pool size started to decrease drastically (from 1,800 in Trial 16 to 1,000 in Trial 30). In the *late*

Table 1. Regression Results for the Prediction of Mean Consumption From the Variables Self-Transcendence Values, Trait Affect, Choice Framing, and Their Interaction Terms ($N = 91$).

	B	*t*	*p*	R^2	ΔR^2	ΔF
Step 1 (main effects only)				.23	.23	8.88***
Self-transcendence values	−1.004	−5.11	<.001			
Trait affect	0.096	0.49	.629			
Choice framing	−0.138	−0.71	.483			
Step 2 (main effects and interaction terms)				.26	.03	1.46
Self-transcendence values	−0.966	−4.70	<.001			
Trait affect	0.136	0.69	.495			
Choice framing	−0.132	−0.68	.499			
Self-transcendence values × choice framing	−0.114	−0.55	.585			
Trait affect × choice framing	−0.303	−1.52	.134			

Note. *B* = unstandardized regression coefficient; *t* = *t* statistic; R^2 = total variance explained; *F* = *F* statistic.
*$p < .05$. **$p < .01$. ***$p < .001$.

phase (Trials 31-45), the pool size continued to decrease, until in the 45th trial the computer announced that the resource pool had been depleted and the experiment was over. Participants were probed for suspicion, debriefed, and thanked for their participation.

Results

Here, we focus on the analyses that are relevant for our five main hypotheses. For further analyses, please refer to the section.

To test our hypothesis that higher self-transcendence values would be related to lower resource consumption overall (*Hypothesis 1*), we computed the mean resource consumption across the three scarcity phases for each individual and conducted a multiple regression analysis using this score as dependent variable. In a first step, we predicted mean resource consumption from *trait affect, self-transcendence values*, and *choice framing*. In a second step, the interaction terms of *trait affect* × *choice framing* and *self-transcendence values* × *choice framing* were entered into the model (Table 1). All independent variables included in the regression analyses were *z*-standardized prior to analyses. Supporting *Hypothesis 1*, self-transcendence values were the only significant predictor of mean consumption, in that participants with more pronounced self-transcendence values showed lower mean consumption rates, accounting for 23% of the variance (see Figure 1). No other variables were significant predictors of mean consumption, and adding the interaction terms did not improve the model.

Figure 1. Regression lines illustrating the impact of self-transcendence values (*x*-axis) on mean resource consumption during Experiment 1 (*y*-axis) for the different choice framing conditions.

To test the hypotheses that higher trait affect would be related to a more pronounced consumption reduction across the course of the experiment (*Hypothesis 2*) and that this influence may be sensitive to the framing conditions (*Hypothesis 3*), we computed individual consumption reduction scores by calculating the difference between mean consumption in the late phase and the early phase for each individual and conducted a multiple regression analysis using this score as dependent variable. In a first step, we predicted consumption change from *trait affect, self-transcendence values*, and *choice framing*. In a second step, the interaction terms of *trait affect* × *choice framing* and *self-transcendence values* × *choice framing* were entered into the model (Table 2).

Results support the notion that trait affect influences behavior when situational conditions change. We did not observe a significant main effect of *trait affect* on consumption reduction; *Hypothesis 2* thus needs to be rejected. However, consistent with *Hypothesis 3*, we observed a significant interaction of *trait affect* × *choice framing*. To break down this interaction, we calculated conditional effects of *trait affect* in both framing conditions. As illustrated in Figure 2, higher *trait affect* was associated with a higher consumption reduction in the gain frame ($B = -0.981$, 95% CI [–1.693, –0.269], $t = -2.74$, $p = .008$) but not in the loss frame ($B = 0.238$, 95% CI [–0.373, 0.849], $t = 0.77$, $p = .441$).

Table 2. Regression Results for the Prediction of Consumption Change From the Variables Self-Transcendence Values, Trait Affect, Choice Framing, and Their Interaction Terms ($N = 91$).

	B	*t*	*p*	R^2	ΔR^2	ΔF
Step 1 (main effects only)				.12	.12	3.77*
Self-transcendence values	−0.437	−1.82	.072			
Trait affect	−0.284	−1.17	.244			
Choice framing	0.544	2.27	.026			
Step 2 (main effects and interaction terms)				.20	.08	4.36*
Self-transcendence values	−0.515	−2.11	.038			
Trait affect	−0.365	−1.55	.125			
Choice framing	0.533	2.31	.024			
Self-transcendence values × choice framing	0.234	0.95	.344			
Trait affect × choice framing	0.613	2.58	.012			

Note. *B* = unstandardized regression coefficient; *t* = *t* statistic; R^2 = total variance explained; *F* = *F* statistic.
*$p < .05$. **$p < .01$. ***$p < .001$.

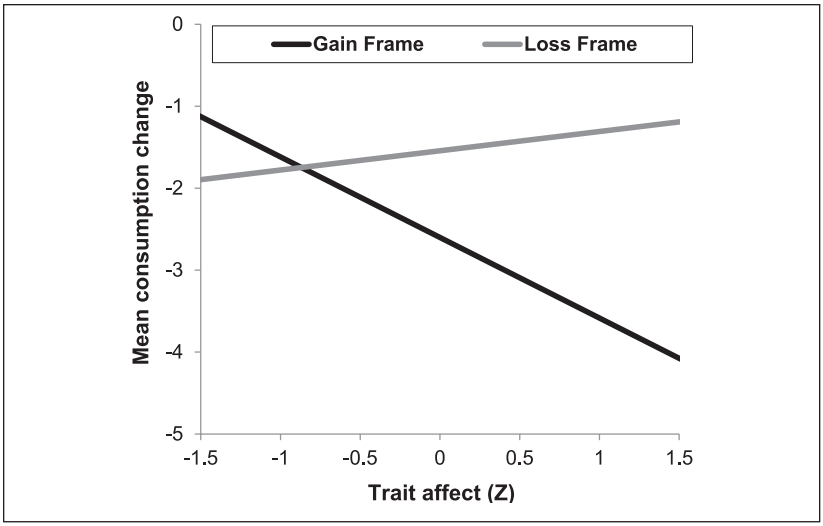

Figure 2. Regression lines illustrating the impact of trait affect (*x*-axis) on consumption change during Experiment 1 (*y*-axis) as a function of choice framing.

Discussion

We investigated the interplay of structural features, trait affect, and self-transcendence core values on individual decisions in the social dilemma task. Replicating and extending previous work on effects of stable personality constructs in the social dilemma task (e.g., Balliet et al., 2009), we observed an effect of core values, in that participants with more pronounced self-transcendence values showed lower overall consumption across both framing conditions of the social dilemma. Moreover, we observed—to our knowledge for the first time—an effect of trait affect on resource consumption, which was sensitive to the choice framing: In the commons dilemma task, but not in the public goods task, participants with high trait environmental affect showed a larger reduction of their consumption when resources became scarce.

Trait affect and core values showed their effect at different levels, in that core values predicted lower consumption across the whole experiment, whereas the effect of trait affect occurred specifically once it became evident that scarcity increases. This dissociation may reflect the different operation mechanisms underlying affective responses and core values: values are stable constructs that consistently influence behavior (Schwartz, 1992), whereas emotions are transient phenomena that are activated in situations with high relevance and help refocus the organism to organize adaptive responses (Brosch, Scherer, Grandjean, & Sander, 2013). Participants with high trait affect may have experienced more or stronger emotions once it became clear that resources were becoming scarce. This may have influenced their response patterns, enabling them to adaptively reduce their resource consumption.

Experiment 2

Although the results of Experiment 1 hint at an important role of emotional reactions in the context of the regulation of resource consumption, we cannot be certain that our participants did actually experience state emotions while performing the task. To more directly address the question whether state emotion influences decision making during the social dilemma task, we experimentally manipulated state emotion in the second experiment. Specifically, we induced the two emotions, guilt and pride, in our participants before the social dilemma task.

Given the important structural differences reflected in the two versions of our social dilemma task, we were especially interested in the interactions of the different emotions with the two versions of the task. As outlined above, we expected that guilt would lead to consumption reductions

in the context of the gain frame, whereas pride would be especially effective in increasing investment behavior in the loss frame (*Hypothesis 4*). We moreover tested the hypothesis that the effects of state emotion on decisions in the social dilemma task would be moderated by an individual's trait affect (*Hypothesis 5*). Importantly, given that in Experiment 2 state emotions are present from the beginning of the task and not only elicited once participants perceive that resources are becoming scarcer, we expect the predicted effects to be visible at the level of overall consumption across the experiment.

Method

Participants. A total of 89 students of the University of Geneva (73 females, M_{Age} = 22.6, SD_{Age} = 4.7) participated in the experiment. The experimental design was identical to Experiment 1, with the addition of the emotion induction procedure outlined below. A power analysis concerning our main hypotheses for this experiment revealed that the likelihood of correctly detecting a significant increase in variance in the dependent variable, given a medium effect size of f^2 = .15 (Cohen, 1988) and the respective sample size of Study 2, was 95.0%.

Measures. To assess self-transcendence values, participants filled in an abbreviated version of the SVI (Schwartz, 1992; Cronbach's α = .86). As this version only assessed a limited range of the value spectrum, scores were not corrected for individual response tendencies. One participant was excluded from the analysis because of extreme scores. Assessment of trait affect was similar to Experiment 1. In contrast to Experiment 1, items were reformulated as statements (e.g., "I feel PROUD when I act in an environmentally friendly manner") to avoid the possibility that scores are influenced by variance in the actual occurrence of environmentally relevant behavior. Responses were assessed using 7-point scales ranging from 1 = "completely disagree" to 7 = "completely agree" and combined into a single score (Cronbach's α = .83).

Experimental design. The experimental design was a 3 × 2 × 2 factorial design with the within-subject factor *scarcity phase* (early/intermediate/late) and the between-subjects factors *choice framing* (gain frame/loss frame) and *state emotion* (guilt/pride). Participants were randomly assigned to one of the four between-subjects conditions.

State emotion induction procedure. The emotion induction procedure was adapted from previous work (Griskevicius, Shiota, & Nowlis, 2010).

Participants were instructed to take the perspective of a character experiencing an academic situation that was prone to elicit either pride or guilt. The effectiveness of this procedure had previously been pretested using an independent sample of 59 participants (please contact the authors for details on the scenarios and the pretesting procedure).

Procedure. The emotion induction procedure and the social dilemma task were presented as two unrelated experiments. The procedure of the social dilemma task was identical to the one described in Experiment 1. At the end of the social dilemma, participants were asked to indicate to what extent they experienced a range of different emotions using 7-point scales. Participants were debriefed and thanked for their participation.

Results

To verify the effectiveness of our state emotion induction procedure, we conducted two regression analyses with the independent variables *state emotion* and *trait affect.* Perceived pride and guilt served as the respective dependent variables. As expected, we found that *state emotion* significantly predicted perceived pride ($B = 1.917$, 95% CI [1.608, 2.226], $t = 12.34$, $p < .001$) and guilt ($B = -1.762$, 95% CI [–2.135, –1.390], $t = -9.42$, $p < .001$). Perceived pride was higher in the pride induction condition as compared with the guilt condition, whereas the reverse was observed in the analysis on perceived guilt. Neither the main effects of *trait affect* nor the interactions of state emotion × trait affect were significant in either analysis (all *p*s > .147).

To test our hypotheses that state emotion would interact with the framing of the task (*Hypothesis 4*) and that these interactions would be modulated by individual differences in trait affect (*Hypothesis 5*), we computed mean resource consumption across the three scarcity phases for each individual and conducted a multiple regression analysis using this score as dependent variable. In a first step, we predicted mean resource consumption from *trait affect, state emotion, self-transcendence values*, and *choice framing*. In a second step, the two-way and three-way interactions of *trait affect, self-transcendence values*, and the two experimental factors *state emotion* and *choice framing* were entered into the analysis (see Table 3).

Results support the notion that choice framing, state emotion, and trait affect interact to influence behavior. We did not observe a significant two-way interaction of *state emotion × choice framing; Hypothesis 4* thus needs to be rejected. However, consistent with *Hypothesis 5*, we observed a significant three-way interaction of *trait affect* with *choice framing* and *state emotion*. To break down the three-way interaction, we computed conditional effects for the interaction of *trait affect* and the two experimental factors. Conditional effects

Table 3. Regression Results for the Prediction of Mean Resource Consumption in the Social Dilemma Task (N = 88).

	B	*t*	*P*	R^2	ΔR^2	ΔF
Step 1 (main effects only)			.014	.14	.14	3.35*
Self-transcendence values	0.057	0.23	.822			
Trait affect	−0.839	−3.39	.001			
Choice framing	0.152	0.67	.508			
State emotion	0.061	0.28	.784			
Step 2 (main effects plus interaction terms)			<.001	.38	.24	4.27***
Self-transcendence values	−0.005	−0.02	.983			
Trait affect	−0.950	−3.96	<.001			
Choice framing	0.183	0.90	.372			
State emotion	0.193	0.94	.349			
Choice framing × state emotion	−0.196	−0.95	.343			
Self-transcendence values × choice framing	0.769	3.34	.001			
Self-transcendence values × state emotion	−0.428	−1.84	.070			
Self-transcendence values × choice framing × state emotion	0.337	1.44	.155			
Trait affect × choice framing	−0.305	−1.27	.208			
Trait affect × state emotion	0.018	0.07	.943			
Trait affect × choice framing × state emotion	−1.029	−4.16	<.001			

Note. Trait affect, self-transcendence values, choice framing, state emotion (Step 1), as well as the two-way and three-way interactions of self-transcendence values, and trait affect with choice framing and state emotion (Step 2) served as independent variables.
B = unstandardized regression coefficient; *t* = *t* statistic; R^2 = total variance explained; *F* = *F* statistic.

revealed that the interaction of *trait affect* and *state emotion* substantially differed as a function of *choice framing* in terms of gains (B = 1.064, 95% CI [0.449, 1.679], t = 3.45, p = .001) or losses (B = −0.982, 95% CI [–1.745, –0.219], t = −2.56, p = .012). In the gain frame, more pronounced *trait affect* was related to lower mean consumption in the guilt condition (B = −1.606, 95% CI [–2.418, –0.793], t = −3.94, p < .001) but not in the pride condition (B = 0.520, 95% CI [–.402, 1.441], t = 1.12, p = .265, Figure 3a). This pattern was reversed under loss frame conditions; here, more pronounced *trait affect* was related to lower mean consumption in the pride condition (B = −2.316, 95% CI [–3.639, –0.993], t = −3.49, p = .001) but not in the guilt condition (B = −0.355, 95% CI [–1.110, 0.401] t = −.94, p = .353, Figure 3b).

Discussion

The aim of Experiment 2 was to investigate whether state emotion influences decision making during the social dilemma task and to evaluate to what extent such an influence interacts with the structural aspects of the task and

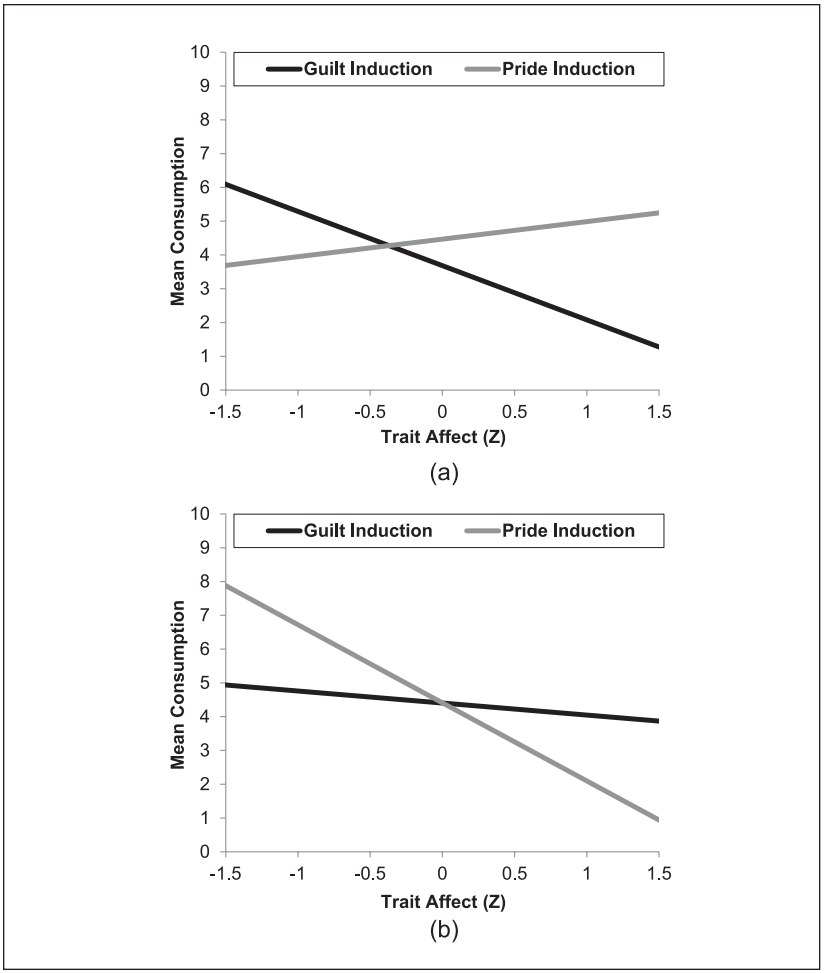

Figure 3. Regression lines illustrating the impact of trait affect (*x*-axis) on mean consumption during Experiment 2 (*y*-axis) as a function of induced state emotion (guilt/pride) in the (a) gain and (b) loss frame.

with an individual's trait affect. We did indeed observe a strong impact of emotions on individual decisions. In participants with high trait affect, induced guilt led to reduced resource consumption in the gain frame—when participants were taking resources for themselves from a common resource. Induced pride, in contrast, led to reduced individual consumption in participants with high trait affect in the loss frame—when participants were asked

how much of the pre-allocated income they want to return to the common resource. Guilt may thus be an efficient lever to promote curtailment behaviors, reducing the amount that people "allow themselves to take" from a common resource. Inducing pride, however, may be a useful intervention strategy to promote investment behaviors in which people actively contribute their own resources to the common good. Although previous work has already pointed toward a role of guilt and pride concerning environmental beliefs, intentions, and self-reported behaviors (Ferguson & Branscombe, 2010; Harth et al., 2013; Onwezen, Antonides, & Bartels, 2013), here we extend this line of research by showing effects of induced emotions on concrete decisions in an experimental setting.

Effects of state emotion were moderated by trait affect. Thus, consumption reduction or increased investments after emotion induction were evident for participants who frequently experience emotions in an environmental context. This may reflect the fact that individuals with high trait affect may be especially sensitive to the impact of emotions on their environmental decision making. They may be "used to" relying on their positive or negative emotions when making environmental decisions, and thus be more likely to apply the incidental emotions of pride and guilt to guide their choices in the social dilemma tasks.

General Discussion

Given the importance of a better understanding of the determinants of environmental decision making, it is crucial to address and systematically investigate the role of emotions in this domain. A better understanding of the influence of emotions on decisions related to resource consumption, specifically to curtailment and investment behaviors, will be important to develop new and targeted intervention strategies to promote a more sustainable lifestyle. The aim of this research was to investigate the impact of trait affect and state emotion on individual decision making in a social dilemma task defined by the structural features resource scarcity and choice framing. In contrast to stable interindividual factors such as core values, which tend to show a consistent effect on decision making over time, we expected emotions to show a high degree of situational adaptability and thus to strongly interact with the structural features of the choice situation at hand. In the first experiment, we found that participants changed their consumption behavior when resource scarcity increased, both when choices were presented in a gain frame and in a loss frame.

We moreover observed an effect of individual core values, in that participants with more pronounced self-transcendence values showed lower overall consumption across both framing conditions. Most interestingly, findings revealed a framing-dependent effect of trait affect: Participants who report to more frequently experience emotions in environmental contexts showed a larger

reduction of their consumption when resources became scarce. This effect was however only observed when participants took from the common resource, not when they were asked to contribute to the common resource. This result is a first indicator that behavioral change, that is, consumption reduction under scarcity in a social dilemma task, can be facilitated by experienced integral emotions.

The specificity of the effect to the gain frame may be tentatively explained by the fact that in the loss frame all participants were exposed to loss aversion, which in itself constitutes a negative affect and which may overshadow affective responses to the increased resource scarcity driven by individual differences in trait affect (see Sokol-Hessner et al., 2009).

In the second experiment, where we additionally induced state emotion before the beginning of the decision task, we again observed pronounced interaction effects between the structural features of the task and the affective variables: In participants with high trait affect, state guilt resulted in reduced resource consumption in the gain frame, whereas state pride resulted in increased investments in the loss frame. As discussed above, these effects are congruent with the role of guilt as a negative self-conscious emotion promoting prosocial choices as well as self-restricting behaviors, and pride as a positive emotion signaling achievement and social status (see, for example, Ketelaar & Au, 2003). Moreover, these findings are consistent with previous research showing that framing effects are modulated by affective reactions (Sokol-Hessner et al., 2009).

As we assessed core values as well as affective variables such as trait affect and state emotion, we are in the position to compare the functioning of values versus emotions across the different experimental paradigms and conditions. At the theoretical level, a certain overlap between core values and emotions/trait affect is to be expected as values are one of the criteria that determine the appraisal-based elicitation of emotion: Emotions are based on what people value (Brosch & Sander, 2016). This notion was supported by the observed moderate correlations of core values and trait affect. However, although core values are stable cognitive structures, emotions are transient multicomponential phenomena. Emotional reactions encompass physiological and motivational changes aiming at mobilizing the organism to deal with a specific relevant situation in an adaptive manner and lose their influence once the adaptive problem is solved (e.g., Brosch, 2013; Scherer, 2009; Scherer & Brosch, 2009). Congruent with this, trait affect should not be interpreted as indicating that people do constantly experience a certain emotional state, but rather as implying a higher probability that specific emotions are elicited in specific relevant situations.

And indeed, in Experiment 1, core values predicted total consumption across the whole experiment, whereas trait affect predicted frame-specific change in consumption, once it became clear that resources would be scarcer.

Thus, it is likely that in Experiment 1, participants with high trait affect experienced state emotion not from the beginning of the task but only in response to the information that the resource was getting scarcer. In Experiment 2, however, state emotion was present in all participants from the beginning of the task as we used an induction procedure creating incidental emotions. Consistent with this induction, the effects of state emotion were observable at the level of mean consumption across the experiment. Moreover, in line with our assumption that in particular individuals with high trait affect would integrate the affective information into their decision response, effects of state emotion interacted with trait affect.

Implications and Future Directions

The observed interactions of affective factors and choice framing point toward potentially efficient intervention strategies based on the elicitation of different types of emotion. As argued before, the two framing versions of the social dilemma task are structurally similar to curtailment behavior and investment behavior (Samuelson, 1990). Based on the result presented here, curtailment behaviors may be efficiently promoted using guilt-inducing advertisements and slogans by focusing on the fact that people may feel bad when they consume more than a fair, sustainable share of a resource, whereas investment behaviors may be more efficiently promoted using pride induction by focusing on the positive feelings that can be elicited by using one's resources for the common good. The differential effects of the two types of emotion moreover varied as a function of individuals' trait affect. Although this may be explained by assuming a more pronounced tendency of people with high trait affect to use emotional states to inform their environmentally relevant behaviors, it also qualifies the potential of emotion elicitation campaigns as not all consumers will react to emotion induction in the same way. However, the observed results allow identifying clusters of individuals who may be especially sensitive to such strategies.

In terms of the applied relevance of these findings, it must be emphasized that the decisions occurred in an experimental context rather than in a real-life environment. Thus, an important next step will be to validate these hypotheses in a real-life decision environment (see, for example, Abrahamse & Steg, 2011). Furthermore, future studies should aim for testing effects in larger samples from the general public to transfer findings from student samples to a broader population.

Additional limitations of the present research emerge from the setup of the social dilemma paradigm that deviated from practices in economic experimental research. For instance, to investigate effects of resource availability as well as to keep experimental conditions between participants as similar as possible, a

bogus feedback on group resource consumption was given independent of participants' actual choices. Moreover, our participants did not receive direct financial payments relative to their choices made in the dilemma task. It has been argued that deception and performance-independent incentives as applied here may affect decisions in economic games (for a discussion see Hertwig & Ortmann, 2001; Ortmann & Hertwig, 2002). Thus, we encourage future research to examine the hypotheses presented here in social dilemma paradigms that conform more closely to classic economic practices. Moreover, we operationalized the core value concept by measuring participants' self-transcendence values. With respect to the environmental domain, previous research has emphasized the relevance of a set of values that are subordinated to the self-transcendence and self-enhancement dimensions (Steg et al., 2014). As the present research is among the first to examine core values in social dilemma paradigms (instead of SVO), it may serve as a starting point for future research that examines the impact of more specific values such as biospheric, altruistic, egoistic, or hedonic values in social dilemma tasks.

Conclusion

Our study highlights the adaptive and flexible role of affective factors in decision making in the social dilemma task that can be differentiated from the effects of more stable cognitive constructs such as core values. Emotions are shown to be important adaptive drivers of consumption decisions and may be potential levers for interventions targeting the promotion of a more sustainable lifestyle. Additional research is needed to explore the full potential of affective mechanisms in the sustainability domain.

Authors' Note

Céline Tarditi and Ulf J. J. Hahnel contributed equally to this work.

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Supplementary Material

Supplementary material for this article is available online.

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